John Reich Journal

Volume 28 / Issue 3 November 2018

JRCS
JOHN REICH COLLECTORS SOCIETY
P.O. Box 3039 Centennial, CO 80161

The purpose of the John Reich Collectors Society (JRCS) is to encourage the study of numismatics, particularly United States gold and silver coins minted before the introduction of the Seated Liberty design, and to provide technical and educational information concerning such coins.

Annual dues $25.00
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The John Reich Journal is the official publication of the Society and is distributed to all members in good standing. Members are encouraged to submit any articles encouraging the study of numismatics and / or relating to early United States gold and silver coins to the editors. Especially needed are articles containing new information about die marriages, die states of published die marriages, attribution methods, collections, collectors, etc.

Cover Photos: 1808 Capped Bust Quarter Eagle. The first, and only, quarter eagle to adorn the Capped Bust design by John Reich. The reported mintage is 2,710 pieces making it a scarce to rare coin, especially when considering it is a one year only type coin. Image courtesy of Heritage Auctions Dallas, Texas.

The John Reich Collectors Society wants you!

To recruit one new member to our organization, copy this membership or direct them to our new website, www.jrcs.org.

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Check the appropriate space below:

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Indicate your area(s) of interest in Early United States Coins:

a __ Flowing Hair Bust Half Dimes
b __ Draped Bust Half Dimes
c __ Capped Bust Half Dimes
d __ Draped Bust Small Eagle Dimes
e __ Draped Bust Heraldic Eagle Dimes
f __ Capped Bust Dimes
g __ Draped Bust Quarter Dollars
h __ Capped Bust Quarter Dollars
i __ Flowing Hair Bust Half Dollars
j __ Draped Bust Half Dollars
k __ Capped Bust Half Dollars
l __ Flowing Hair Bust Dollars
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for a complete listing of the issues in stock.

John Reich Journal

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Contents

Editor's Comments

Welcome to the final issue of The John Reich Journal for 2018. We all sincerely wish everyone a joyous holiday season and prosperous new year!

This also means it is time to renew your membership. Please find enclosed with this issue your dues renewal form as well as the ballot for voting for the Jules Reiver Literary Award. Hopefully you can take the time to send in your renewal check and vote before the calendar turns to the new year. We will accept voted for the Reiver award until January 30, 2019. The winner will be announced at the ANA convention in August.

You can also nominate someone for induction into the JRCS Hall of Fame. Nominations will be accepted for the Veteran category, those who contributed to the Bust Collecting hobby prior to JRCS and Modern category, those who were members of JRCS. Nominations should be sent to Richard Meaney at richard.meaney@yahoo.com. Please include any information on your nominee that the committee should consider in vetting your nomination. Any inductions will also be announced at the ANA convention.

We will have a meeting at the annual FUN convention in Orlando on Friday January 11th at 8:30 AM. Please check the FUN program for meeting room information. Our speaker this year will be David Finkelstein. The title of his presentation is; "John Vaughan's April 1798 Petition to Congress for Financial Relief Because the Mint Melted His Silver Bullion Deposits to an Illegal 90% Silver Standard". This is an interesting story from the years of our early Mint. Many of us are looking forward to hearing what David has uncovered in his research of the Mint Archives.

Half Dime Census

The officers of the JRCS are soliciting your half dime inventory information for inclusion in the Spring 2019 issue of the John Reich Journal.

Please email your complete inventory listing, including all duplicates, of all your 1792, Draped Bust, Flowing Hair and Capped Bust half dimes to me. Any format that my iMac computer can read will work, so most spreadsheets and word processing files will be fine. Even if you have a written list, you can take a picture of that written list and email it to me if you would like. Please make the subject line of your email "Half Dime Census" and include your name and JRCS number.

My email address is: richard.meaney@yahoo.com. If you prefer, you may mail paper copies to me here: Richard Meaney, 3060 N Lazy Eight Court, Suite 2, PMB 294, Wasilla AK 99654

Please include the following information to the best of your ability:

- Grade of each coin. Grading company info (NGC, ANACS, CAC, PCGS, raw) is not needed.
- Die Marriage or remarriage for each coin
- Cud information for your coins with known cuds. For example, if you report an 1830 LM-5 half dime in VF-20, I will assume the coin does not have a cud. If you have one with a cud, something like "1830 LM-5 VF20 cud" will suffice.
- If you would like to participate, but wish for your contribution to remain anonymous, just let me know.

Please respond no later than March 7, 2019 to ensure inclusion of your collection in this census. This is a hard cut-off date. Questions? Let me know!

Richard Meaney, JRCS LM47

A New Small Size Capped Bust Dime Reverse CUD

By Louis Scuderi

Russ Logan once told me that he believed that most of the "small" collar bust dime reverses between 1828 and 1837 failed with CUD's. In our recent book on Capped Bust Dimes (Zach et al., 2015) we documented 32 CUDs on large and small collar capped bust dimes. This number is up from the 18 documented by Davis et al. (1984, pp. 274-275) and likely represents the impact of an increased number of dime collectors who, though meticulous searching, have uncovered many previously unknown terminal die states. Of the CUDs documented for small collar die marriages, 23 occur on the reverse, 5 on the obverse, and one, 1832 JR2/3, is an edge collar CUD (Scuderi, 2001). Two marriages, 1830 JR3 and 1830 JR4 have both obverse and reverse CUDs.

Currently, of the 39 small collar reverse dies, 23 are now known with CUD failures. This is up from the 11 documented by Davis et al. (1984) and suggests that Russ may have been correct about reverse die failure. The newest find is the 1835 JR5 which has an obverse with a straight flag 5 and a block 8. This obverse is married to Reverse BQ with both dies non-die linked to any other. The EDS 1835 JR5 reverse (Figure 1 Upper) shows no cracks. Davis et al. (1984) note only one crack on the reverse die (Figure 1 Lower Left), namely a crack from the rim through the upright of E2 to the scroll over the B in the motto.

Figure 1. Upper: Early die state of 1835 JR5 (Obv. 3 Rev. BQ) without die cracks. Lower Left: Early crack from rim through E2 and down to scroll above B. Lower Right: Later die state with the crack enlarging between E2 and scroll and a very faint crack extending from the rim to the top and center of the F.

Figure 1 Lower Right illustrates a slightly later die state where the die continues to fail through E2 and the crack intensifies and advances along the top of the scroll. The tops of the motto letters BUS U are beginning to be obscured, eventual touching the top of the S in PLURIBUS as the die deteriorates.

Figure 2 (Upper) illustrates a VLDS 1835 JR5. On the upper reverse (Figure 2 Lower Left and Right) the original crack from rim to the scroll thickens, advances across top of scroll to the right side of the U and then further extends back up through the F (three closely spaced cracks from the scroll to the F and then one through the F to the rim). If you look closely at the crack along the scroll the tops of the letters BUS U are partially obscured. This is a retained CUD sliding at an angle and can be interpreted as a broken portion of the die shifting downward and blocking any impression of the tops of these letters. This is now what I now term a scroll CUD. Scroll CUDs on half dimes and dimes will be the topic of a later paper.

Figure 2. Upper. 1835 JR5 VLDS with retained CUD. Lower Left: VLDS Cracks. Lower Right: VLDS retained CUD outlined. Note that the tops of motto letters BUS U are further obscured as the CUD progresses.

Interestingly, the BQ reverse of JR5 is the last used prior to minting 1836 dimes. All five reverses used during 1836 and 1837 (BR, BS, BT, BU, BV) are currently unknown with obverse or reverse CUDs. Of these, four (BS, BT, BU, BV) have a terminal obverse usage with a bisecting crack. Hypothesizing that CUD failures and bisecting obverse cracks on dimes, like their half dime counterparts, are associated with press type stress (rotational-screw vs. vertical-steam), then it is unlikely that after the late 1835 press type change that these last five reverses will exhibit CUD failures. However, and based on Russ Logan's speculation, there may be as many as 11 reverse CUDs between 1828 and 1835 awaiting discovery. If they exist let's find them!

References

Davis et al., 1984, Early United States Dimes, 1796-1837. JRCS, Ypsilanti, Michigan. 279pp.
Scuderi, 2001, The Broken Edge Die on 1832 Reverse B Dimes. JRJ 13(3) pp.24-29.
Zack et al. 2015 Bust Dime Variety Identification Guide. 130pp.

Reeded Edge Half Dollar Census

By Jim Koenings

It is my honor and privilege to present the first census for Reeded Edge Half Dollars in the 32 year history of the John Reich Collectors Society. A special thanks goes to Dick Graham for all the help he has given me in the past, present and future.

At least Martin Luther Beistle considered Reeded Edge Half Dollars when he wrote his book "A Registry of Half Dollar Die Varieties and Sub-Varieties" in 1929. He listed 44 different die varieties of Reeded Edge Half Dollars at that time. In 1967, when Al C. Overton wrote his book " Early Half Dollar Die Varieties 1794-1836" he chose to ignore Reeded Edge Half Dollars and thus influenced many half dollar collectors. When Jules Reiver produced his book " Variety Identification Manual for United States Reeded Edge Half Dollars 1836-1839" in 1988, he thought there were 58 die varieties. In 2012, Dick Graham determined there were 56 die varieties when he wrote his book "A Registry of Die Varieties of Reeded Edge Half Dollars 1836-1839."

Since then, only one collector, "CL" has been able to find all 56 die varieties as shown below in the first "Reeded Edge Half Dollar Census". Not only did he find all 56 die varieties, but he also has the highest average grade of 60. A fantastic accomplishment, especially since several die varieties are not known in MS. He has an 1838-O GR-1 (9 known) and an 1839-O GR-2 and 1839-O GR-3 both having only 1 known.

Until someone finds a second 1839-O GR-2 or GR-3, the average collector will have to be content with having 53 die varieties, maximum. Below are the top 15 collections that were reported and listed by JRCS Number or by owners initials. You might also notice that several have an "a", "b" or "c" after their JRCS Number. Those members either reported duplicates or they had different die stages. Some members may be working on a 2nd or more set.

One Old Time East Coast Collector, that I have known for many years, shared the fact that he owns an 1838 GR-5 Late Die State and an 1839 GR-1, small letters with VF detail. I have included these coins in the totals as a 50 and 20. He has made no claims to owning an 1838-O and I seriously doubt that he owns either an 1839-O GR-2 or GR-3, so I am assuming that he owns 53 different die varieties. Perhaps he will share his total census with us in the next census.

Thank you to all of the 22 collectors that submitted their census, especially to the following:

JRCS #22	JRCS LM#59	JRCS #1039	JRCS #1404	JRCS #1460
JRCS #1521	JRCS #1530	"DL"	"NW"	"WL"
BHNC #169				

Although the above JRCS members or INITIALS are not listed in the "Top 15" collections, their coins were included in the totals.

It is easy to understand why so few 1838-O GR-1's and 1839 GR-1's were reported as not everyone that collects by Red Book varieties is a member of JRCS. Likewise, several collectors report their 1836, 1837, 1838, 1839 and 1839-O's to Registry Sets, like NGC and PCGS. Many of their coins are much higher in grade than the ones reported in this census.

Note: 048d with 22 reported and 703c with 9 reported were not shown in the Top 15 collections in order to show 2 very important collections that had only 9 reported. Both of the collections, with 9 reported, had an average grade of 55 and I suspect in future Reeded Edge Half Dollar Censuses they will place much higher in the ranking.

A few interesting facts that I have observed from the Reeded Edge Half Dollar Census are as follows:

1. 1837 GR-19 was the least reported 1837 with 5
2. 1837 GR-25 was the 2nd least reported 1837 with 6
3. 1837 GR-10 was the 3rd least reported 1837 with 7
4. 1838 GR-16 was the least reported 1838 with 7
5. 1839 GR-5 was the most reported 1839 with 21
6. 1839-O GR-1 was the most reported 1839-O with 20
7. 1839 GR-1 had the lowest reported average grade with 30
8. 1838 GR-3 had the 2nd lowest reported average grade with 34
9. 1838 GR-5 is missing from 8 of the Top 15 collections
10. 1839 GR-1 is missing from 12 of the Top 15 collections

JRCS members may continue to report their acquisitions to me at **bustcoin1@verizon.net** as I plan to keep an ongoing census.

On the next page is the first Census for Reeded Edge Half Dollars:

CENSUS

Reeded Edge Half Dollars - 1836 to 1839

Year	GR#	Rarity	JRCS MEMBER NUMBER or INITIALS						
			CL	48a	703a	212	48b	1104	263a
1836	GR-1	2	65	45			3	45	
1837	GR-1	5	62	50	62	50	45	45	35
	GR-2	3	55	45	45	45	45	45	12
	GR-3	2	62	58	55	45	45	50	6
	GR-4	3	63	61	62	35	53	50	30
	GR-5	1	64	58	55	50	53	50	20
	GR-6	3	63	62	58	25	25	20	
	GR-7	2	63	53	55	45	45	25	
	GR-8	4	64	45	55		45	40	45
	GR-9	1	65	55	61	45	40	45	40
	GR-10	4	62	55	58	45	50	20	20
	GR-11	5	63	58	45	35	50	40	45
	GR-12	2	62	62	62	50		60	35
	GR-13	1	60	58	53	35	50	8	
	GR-14	1	62	61	53	62	50	55	12
	GR-15	3	63	50	40	35	45	20	45
	GR-16	4	58	55	61	50	53	50	40
	GR-17	1	64	58	55	58	15	40	40
	GR-18	1	66	45	62	58			15
	GR-19	3	64	62	62			30	
	GR-20	3	63	58	58	30	53		25
	GR-21	2	62	53	58	55	30	30	25
	GR-22	2	64	55	55	45	40	40	30
	GR-23	2	65	62	58	12	40	58	
	GR-24	2	64	61	62	50	40		
	GR-25	5+	62	45	55		8	4	

CENSUS

Reeded Edge Half Dollars - 1836 to 1839

JRCS MEMBER NUMBER or INITIALS								RPD	AVG.	MAX
48c	1387	703b	263b	869a	DP	1074a	1313			
	61			30	45	62	53	13	43	65
40								9	47	62
45		45	8					14	37	55
35	61	53						12	45	62
45		50						12	46	63
40	62	53			35			14	48	64
20		58						8	41	63
20					45			10	43	63
40			40					9	44	64
	61		35					10	46	65
								7	44	62
45	58	45	30					12	46	63
	63	50	8					9	50	63
40	55	45			58			12	46	60
45	62			40	45	64	62	18	46	64
40	62		30					11	41	63
50			12	45				11	43	61
	62	55			58			12	50	64
			8	35				9	44	66
		58						5	55	64
40	62					58		10	45	63
	63	40						9	46	63
30							58	12	45	64
20	55			30			53	10	45	65
30	62	61		30				9	51	64
		45						6	37	62

Reeded Edge Half Dollar Census

Year	GR#	Rarity	JRCS MEMBER NUMBER or INITIALS						
			CL	48a	703a	212	48b	1104	263a
1838	GR-1	3	66	45	55	55	30	45	30
	GR-2	3	63	58	58	50	35	25	30
	GR-3	2	63	53	40	45	45	30	6
	GR-4	1	40	35	62	63	35	20	35
	GR-5	7	55	53	50	50	50		
	GR-6	3	58	53	58	61	50	30	8
	GR-7	4	61	58	53	40	55		45
	GR-8	2	62	30	58	55		20	35
	GR-9	3	65	55	58	50	50	40	40
	GR-10	3	63	62	45	40	55	25	8
	GR-11	1	64	58	55	50	55	30	45
	GR-12	4	64	53	55	55	45	40	35
	GR-13	1	64	58	55	30		50	20
	GR-14	3	55	58	61	55	45	50	25
	GR-15	3	62	58	64	40	53		35
	GR-16	4	58	45	40	55	45		6
1838-O	GR-1	7	64						
1839	GR-1	7	45	50					
	GR-2	5+	62	45	62		45	45	45
	GR-3	5+	53	53	61	30	50	40	
	GR-4	1	53	53	58	30	45	40	18
	GR-5	2	66	50	62	58	50	45	10
	GR-6	3	64	55	55	45	50		15
	GR-7	1	62	58	61	40	53	58	20
	GR-8	3	50	58	61		50	20	45
1839-O	GR-1	1	66	35	53	50	30	45	6
	GR-2	8	35						
	GR-3	8	35						
	GR-4	4	55	30	50	45		40	
	GR-5	4+	55	40	45	40	12	50	30
Marriages Owned			56	53	51	45	45	44	41
Average Grade			60	53	56	46	43	38	27

JRCS MEMBER NUMBER or INITIALS								RPD	AVG.	MAX
48c	1387	703b	263b	869a	DP	1074a	1313			
15		45	25					12	40	66
				45		58		9	47	63
20			4					9	34	63
35	58	50	30		58	62		17	44	63
50		50						10	44	55
50	58			45	35		62	13	48	62
53		45						10	50	61
	63	58						10	47	63
40	55	55		45		64		16	48	65
53	62	45						13	44	63
50	58	55	35		58			15	49	64
	62		12				40	12	43	64
	62	45	10		45			11	42	64
45	58							10	49	61
45	62	61		45			53	14	52	64
		35						7	41	58
								1	64	64
						4		4	30	50
35		50		40				12	45	62
40		55						10	47	61
20	62	55	12	30				14	37	62
45	61	58		40			55	21	49	66
20	62				58			9	47	64
35	58		12	35	45	61		16	44	62
50	58	55						13	49	61
	58	45		40	35	62	55	20	45	66
								1	35	35
								1	35	35
	55	35			35			8	43	55
								8	36	55
35	31	31	16	15	14	9	9		56 known Die	
38	60	50	19	38	47	55	55		Marriages	

A Closer Look at the So-called 1818/7 Large 8

James Ross

INTRODUCTION

What's wrong with this picture? This question springs to mind when one views an 1818/7 Large 8. A few conundrums strike the eye:

1. John Reich engraved it (has his scalloped star 13), yet he left the mint in early 1817. If there was a ready-made die dated 1817, why wasn't it used in 1817? After all, someone went to the trouble of making the 1817/3 and 1817/4 from surplus Reich-engraved dies.
2. The portrait of Miss Liberty on the 1818/7 Large 8 does not look like any other non-overdate 1817 – it is of the same design type used in 1812-1814 with high relief and bold, coarse curls.
3. The large 8 punch was not used in preparation of any other non-overdate 1817 dies.

This article will present evidence to resolve these conundrums and place the origin of the obverse die used to strike the 1818 O-101 and O-103 in its correct year.

DENTIL COUNTS

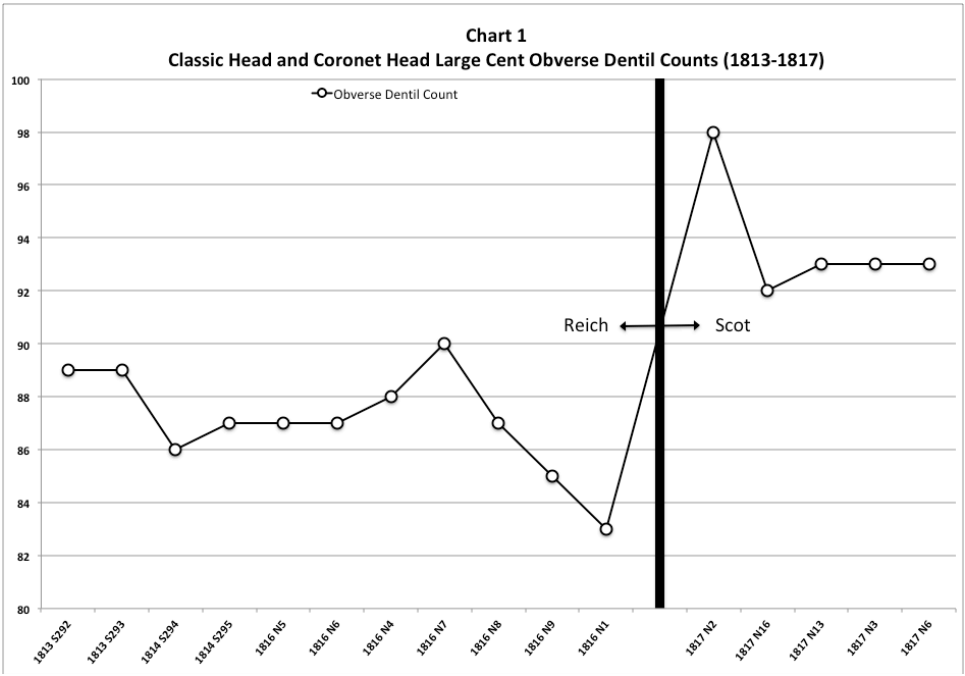
1818 O-101 has 97 obverse dentils – a count that fits well with the obverse dies John Reich engraved in 1813 (refer to Table 1). There are no half dollar dies from 1815-1816 (1815 is 15/2, so that die was made in 1812) to use in predicting the dentil count John Reich would have used in 1817, but we do have evidence from Large Cents. As detailed in this writer's July 2018 JRCS Journal article, "The Dentils of Robert Scot and John Reich," the dentil counts on 1814-1816 Large

Cents illustrate Reich's declining ability due to failing eyesight (refer to Chart 1). Reich himself wrote in 1817 that his failing eyesight had "*already made me refuse all work of this kind* (i.e. engraving)." It is unlikely that Reich was capable of engraving a half dollar die in 1813-1814.

Table 1

1813-1814 CBH DENTIL COUNTS							
Year	DM	Obv.	Dentils	Year	DM	Obv.	Dentils
1813	O-103	2	98	1814	O-104	4	98
1813	O-101	1	97	1814	O-108	7	97
1813	O-108	6	97	1814	O-107	6	97
1813	O-106	4	98	1814	O-105	5	99
1813	O-105	3	97	1814	O-109	8	100
1813	O-107	5	97	1814	O-102	2	100
1814/3	O-101	1	101	1814	O-103	3	95
1817/3	O-101	1	101	1817/4	O-102	2	98
1818/7/3	O-101	1	97				

Note: Non-overdate dies are listed in emission order. Overdate dies are listed at end of under-digit year.



DESIGN TYPE

1818 O-101 is of obverse design type 7, which was used from 1812-14. Design type 8, used from 1817-1825, has more finely engraved curls and a lower relief than design type 7. A change in design type involves re-engraving the master hub – a time-consuming task. It is much more likely that the master hub was modified (from type 7 to type 8) sometime during 1815 or 1816, when the workload of the engravers was light, than in early 1817 when Robert Scot was suddenly tasked with all engraving duties at the mint upon John Reich's resignation.

PHOTOGRAPHIC EVIDENCE AND OVERLAYS

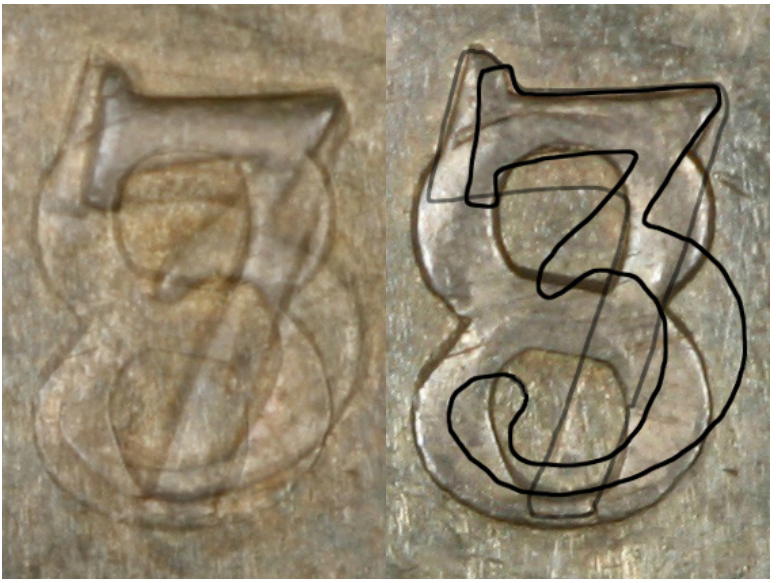


Figure 1

The left portion of Figure 1 above shows a photographic overlay of 1818 O-101 with a 7 from 1817 O-112 and a 3 from 1813 O-105. For clarity, the right portion of the figure shows the 1818 O-101 and outlines of the 7 and 3.

As can be seen, the angle of the upper-left portion of the 7 is a match for the remaining under-digit on the 1818 O-101, as are the diagonal remains in the lower loop of the 8 a match for the left side of the upright on the 7.

The acute angle at the upper-right of the 1818 O-101 is a closer match to a 3 than a 7. The horizontal portion of the top of the under-digits is not a straight line, but instead has a slight curve. This curve could be the result of the 7 being canted slightly clockwise in relation to the 3 (top of 7 shows on the left and top of 3 shows to the right). No 7 punches used in 1817 have curved tops.

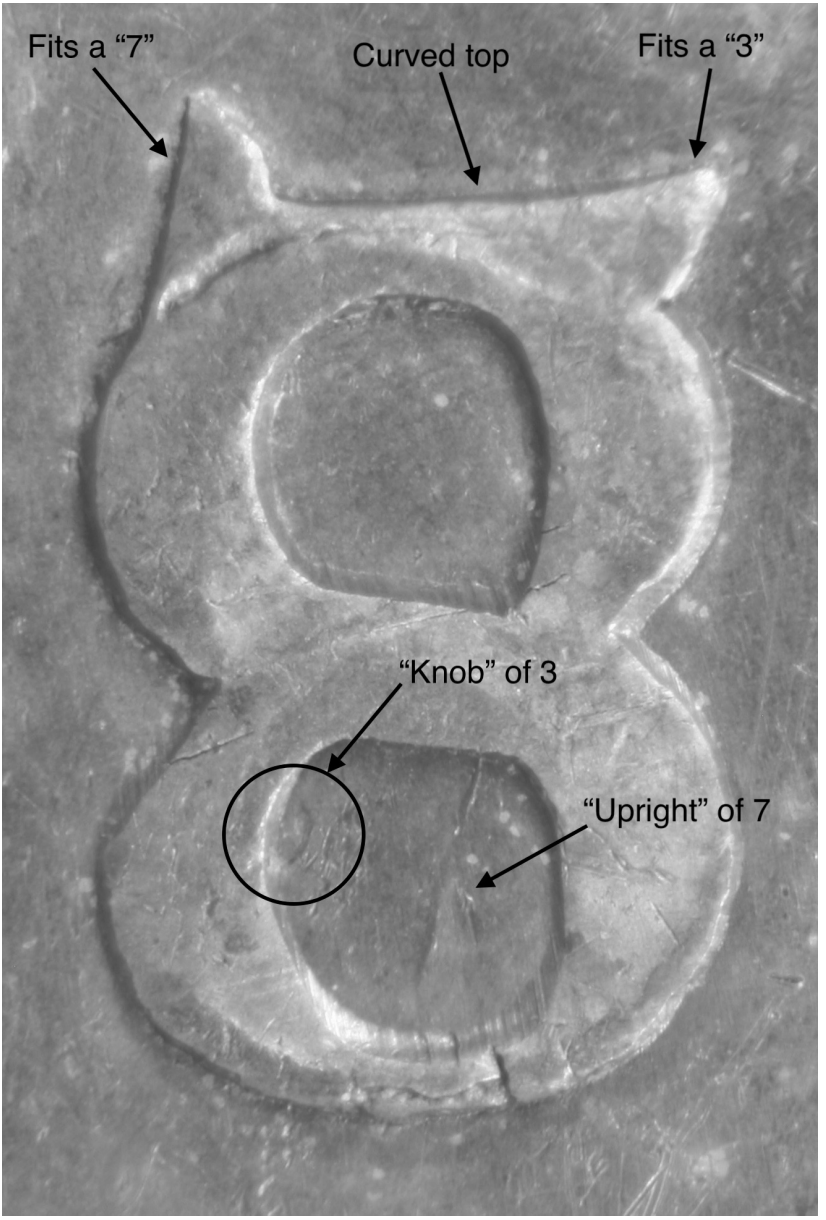


Figure 2

The un-edited photo in Figure 2 is of a very early die state 1818 O-101. The remains of the lower upright of the 7 show clearly in the lower loop of the 8, as do the remains of the “knob” at the end of the loop of the 3.

SUMMARY

John Reich engraved and "signed" the obverse die used for 1818 O-101 and O-103. If he engraved it in 1817, it most likely would have been used in 1817.

The dentil count on 1818 O-101 matches the count on other half dollar dies that Reich prepared in 1813. The dentil count on 1816 large cents decline with time, as do the dentil counts on all other denominations of dies that Reich prepared. It is unlikely that he prepared a die in 1817 with the same dentil count he had been engraving in 1813.

Design type 7 used on 1818 O-101 points to it being an 1813 die, not an 1817 die.

Overlays of a 3, 7 and 1818 O-101 reveal:

- The remaining under-digit at the upper right fits a 3, not a 7.
- The curved top of the under-digit results from the 7 being slightly canted in relation to the 3 when it was over-dated.
- A lump in the left side of the lower loop of the 8 is correctly positioned to be the "knob" of a 3.

CONCLUSION

The obverse die used to strike the 1818/7 Large 8s (O-101 and O-103) was engraved by John Reich in 1813 and these die marriages should be referred to as the 1818/7/3 O-101 and 1818/7/3 O-103.

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Resources:

1. PCGS Coinfacts
2. Heritage Auction archives

Die chip failures on Capped Bust Half Dime Reverses

Louis A. Scuderi

Logan and McCloskey (1998) in their treatise on Federal Half Dimes were the first to provide detailed descriptions of all known half dime die marriages and remarriages. In their own words the dominant focus of their book was "the documentation of the working die". Die states were determined using a wide range of markers reflective of actual die deterioration, including indicators of wear, and cracks and die chips that were indicative of brittle failure of the working die. As well, die damage in the form of clashing and die "repair" in terms of lapping were often used to determine emission order in some very complex die marriage/ remarriage chains. In this paper, I will concentrate on an analysis of die chips resulting from brittle failure and attempt to use their characteristics and distribution across dies to infer information about the working dies and their use in the capped bust half dime series. This is not meant to be a definitive statement on the topic. Rather, it is a starting point from which we may be able to better understand the minting process. A related discussion of CUD's on half dimes will be the focus of a follow up paper.

What are die chips and why do dies chip?

Die chips, which are the result of stress introduced by repetitive striking of the die, are raised regular or irregular blobs of metal found primarily in recessed areas of die elements. They are small broken off portions of the die, usually found where the field meets a design element. They result primarily from weaknesses in the design of the die with respect to metal flow and are commonly associated with stress risers which are areas on the die where there are abrupt changes in stress flow gradients.

Hypothetically, if the die material is flawless and there are no surface or subsurface die discontinuities there normally is near zero stress on the die face even after repeated striking. However, a change in the direction of features on the die increases stress concentration. If this directional change is smooth (Figure 1- left) stress is distributed over a larger area and is relatively unconcentrated. However, if there is an abrupt change in the surface of a die, as in the case of a design element which has a right angle (Figure 1- right), stress lines are crowded together and stress is concentrated at that location.

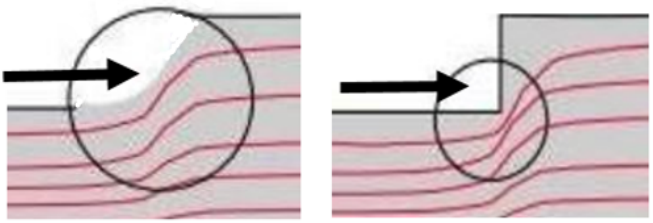

Figure 1. Differences in stress concentration produced by a transition (left) like what might be found on the smoother portions of the central obverse and reverse elements (bust and eagle respectively) versus a sharp transition (right) stress riser like that found at the right-angle edges of letters, numbers and obverse stars.

When large stress gradients occur in small localized areas, this high stress is referred to as stress concentration. The *stress concentration factor* K_t is defined as the ratio of the calculated peak stress (σ_{max}) to the nominal stress (σ_{nom}) that would exist in the if the distribution of stress remained uniform and is given by;

$$K_t = \sigma_{max}/\sigma_{nom}$$

If die material is flawless and has no discontinuities, then the stress concentration factor is 1, whereas if there are large discontinuities, the stress factor is greater than 1. Under loading at locations where there is a discontinuity in surface geometry, the flow of stress is modified and disrupted causing high stress gradients with maximum stress greatly exceeding nominal unloaded values (Young and Budynas, 2002). This results in chips and other failure types over time and produces raised areas on the struck coin where a recessed area would normally be expected.

Analysis of Die Chips on Capped Bust Half Dime Reverse Dies

In this paper, I focus on die chips on capped bust half dime reverse dies, and specifically on the order in which they form across die chains, to determine where these die defects first form and to assess possible stress fields that may have generated these die defects. All capped bust marriages and remarriages detailed in Federal Half Dimes 1792-1837 (Logan and McCloskey, 1998) were reviewed and the development of die chips in all possible locations in the words UNITED STATES OF AMERICA (Figure 2) were documented. For these locations three variables were quantified 1) Open or closed area (35 open, 7 closed – D, A's, O and upper portion of R), 2) For open areas is the opening right or left facing (22 right, 13 left), and, 3) the presence of a sharp angle in open areas (4 cases- N and M). Figure 3 shows locations of the 14 chips found and documented in this analysis of reverse die chips.

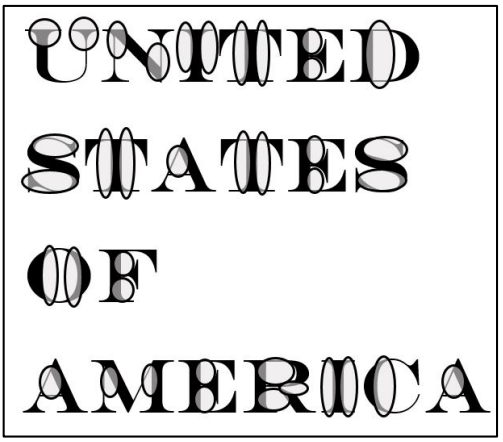

Figure 2. Locations evaluated for die chips on each of the 36 capped bust half dime reverse dies. The size of the ovals roughly corresponds to the size categories used later. I, T, D, S, O, and the upper portion of the R and C are considered large (19 locations) with the remainder considered small (28 locations). Curved sections are found at 7 locations (S, O, C). Sharp acute angles are found at 4 locations (N, M). Six small potential chip areas on either side of the inner portion of the lower legs of the A's as well as three other potential areas of chipping, on the interior of the lower left leg of the N and the lower left and right legs of the M, are not shown since they did not exhibit chipping on half dime reverses.

Figure 3. Key for locations of chip failures. T1 chips in the upper right opening, E1, E2 and E3 chips occur in the lower right base of the E except for the E3 chip on 1830 LM3 which occurs in the upper portion of the E above the crossbar. The chip in the D occurs at the inner junction between the upright and the lower portion of the figure. F fills between the crossbar and the lower right serif on three dies and additionally above the crossbar in 1832 LM5.

Counts of die chips for each reverse along with reverse CUD's are tabulated in Table 1 with the first (X1) and second (X2) occurrence of die chips for each die indicated. Relationships between the general location of these die defects and features of the obverse die were quantified and analyzed to determine whether specific reverse locations, relative to obverse die features, may have generated stresses that produce these chips. The size, shape and direction of the openings that contain die chips were also analyzed to determine whether there is any commonality in chipping failure modes.

I note precautionarily, and before proceeding to the analysis, that we have likely not seen all possible VLDS. As shown later for 1832 LM3, undocumented die chips (S1 Lower Loop) do exist and it is likely that with the discovery of additional VLDS specimens that some additional chips and CUD's will be found. Extremely small die chips, visible on only the highest-grade specimens, may also have been missed since my access to the highest-grade coins is limited and available images of many of these super grade coins preclude examination in the detail required to identify incipient chips.

Table 1 presents summary information for the occurrence of die chips for each of the 36 reverse dies. Several important observations can be made from the tabled data. The first is that not all dies developed chips. The early 1829 reverses A, B, and C, all of which used edge collar #1 with 91 reeds, exhibit no die chips (reverse D has a tiny and previously undocumented chip at ML). Later in 1835, and starting with reverse die CC (1835LM5 and LM6), only 1837 LM1 (Rev. KK) and 1837 LM4 (Rev. EE) which both terminate using edge collar #10 (96 reeds) develop chips. Additionally, 1837 LM 4, which exhibits die chips on the upper loops of S1 and S2, is die linked to 1835 LM10. 1835 LM10 is interesting in that its obverse die with its easily recognized small date with a low 3 is, in a sense, anomalous being used only once. Logan and McCloskey (1998) placed 1835 LM10 close to the end of the 1835 emission order, likely based on its use of collar #8 (97 reeds) and its small date. However, and as I discuss later, this heavily used die which also exists with collar #7 may have come earlier in the sequence.

Year	Variety	NL	NR	T1	E1	D	S1U	S1L	E2	S2U	S2L	F	ML	MR	E3	CUD	REV
1829	LM1																A
1829	LM2																B
1829	LM3															IT	C
1829	LM5												X1				D
1829	LM7.3	*	X1							X2						ER	E
1830	LM1.2															ERI	G
1830	LM3		X1										X2		*		H
1830	LM8		X1			*							X2				K
1831	LM1.3		X2	*			*			X2			X1	*		NIT	L
1831	LM2	X1														R	F
1830	LM12		X1		*	*			*	*			X2	*			J
1831	LM5		X1				X2										N
1832	LM2											X1					M
1832	LM3		X2					X1									Q
1832	LM5		X2				X1	*		*		*			*	TEDSTA	R
1833	LM1						X1									EDSTAT	S
1833	LM3.5		*		*	*	X2			X1	*					NITE	T
1834	LM1															ED	V
1833	LM6									X1						CA-inter.	W
1832	LM10.4		X1													TESOFA	U
1833	LM8															ITEDSTA	X
1832	LM13																Y
1835	LM1		X1							X2	*					ITE	P
1835	LM2		X1														Z
1835	LM3		X1									X2				CA-inter.	AA
1835	LM4		X1													UNI	BB
1835	LM5.2															DSTATES	CC
1836	LM1.2															TEDSTAT	DD
1836	LM3															A2-rim	GG
1836	LM4																FF
1836	LM5																HH
1836	LM7																JJ
1837	LM1		X1														KK
1837	LM3																LL
1837	LM4						X2			X1							EE
1837	LM5																MM
SUM		2	15	1	2	3	6	2	1	8	2	3	5	2	2	18	
1st		1	11				2	1		3		1	2				
2nd			3				3			3		1	3				

Table 1. Die chip occurrence for each capped bust reverse die. Dies are listed in order of use and only the terminal marriage/remarriage is shown. Known CUD's are also shown (inter. = Internal). SUM is the total number of occurrences for each die chip, or in the case of CUD's the number of dies that exhibit documented reverse die CUD failure. Cells also show the first (X1) and second (X2) chips that form on each die. If there are more than two die chips an * indicates these later occurring die chips.

The most common failure location, and most likely area to chip first, is the right side of the N. Almost 40 percent of the reverse dies (15 of 36) fail at this location and in 11 cases this is the first chip that occurs. The second most likely failure locations are the upper loops of S2 and S1 with 8 and 6 chip failures respectively. Combined, chip failures at these 3 locations occur first in 16 of the 36 reverse dies, and more importantly are found in ~71 percent (15 of 21) of reverse dies that exhibit any sign of chip failure. Adding the die chip that occurs on the left side of the M (5 occurrences), it is apparent that the most likely location of die failure on capped bust half dime reverses is in the sharp angles of the N and M and in the rightward pointing open upper curves of S1 and S2. My subsequent analysis will primarily be confined to these locations.

However, before I continue, I must note a few additional oddities about the die chips in capped bust half dimes. Larger size capped bust denominations exhibit filled letters and die chips on a small percentage of dies such as chipping in the N and E3 on the 1831 Reverse A capped bust dime (Davis et al., 1984; Reverse AY in the Zack et al. (2015) sequence), chipping in the M and N on reverses used in 1831-1833 for small sized capped bust quarters (Tompkins, 2008), and a small number of filled A's, a filled upper loop in S1 on 1826 O-112, and occasional chipping of N and M on some capped bust half dollars (Parsley, 2005). In contrast, capped bust half dime reverses exhibit chips on ~55 percent of the dies.

This is unlikely due to chance. More likely this disparity is associated with the small size of the dies, the small size of the letters on those dies, higher focused striking pressure on the smaller half dime dies in the screw press or some combination of these factors. It is also important to note that the interiors of A1, A2 and A3, which are smallest enclosed internal letter areas, are not filled on the capped bust half dimes and, other than minor die chipping on three reverses at the lower right interior of the D, none of the other internally closed areas (O and upper loop of R) exhibit chips.

Location of Reverse Die Chips Relative to Obverse Features

Fortunately, and itself an interesting unresearched topic, there are few significant reverse rotations in the series so assessing the relative position of the obverse and reverse dies is simple. With the prominent die clash that occurs frequently below the scroll as a guide, I constructed an overlay in Figure 4 that illustrates the general relationship between obverse features and reverse die chip locations.

Figure 4. Obverse/reverse die relationships. Dark outline is at the approximate position of the obverse relative to the reverse for most capped bust half dime marriages.

The most common die chip locations at N and in the upper loop of S2 are located far from the obverse die impression. The chip locations in M are closer, but not directly in line with the edge of the obverse die impression, while the location at S1 Upper falls right at the edge of the obverse edge device. Interestingly, only chips that form at S1 Lower coincide with the obverse device. Considering that a chip at S1 Lower only occurs twice in all the reverse dies, and that the four most common die chip locations do not coincide with likely contact points from obverse die clashing, it seems unlikely that die clashing produces most chips.

The Size and Shape of Spaces Within the Reverse Letters

There is a great deal of variation between the size, shape and orientation of spaces within the letters. I categorized the size and shape of all (47) potential die chip areas into general categories; large versus small and flat versus curved. I also quantified open versus closed areas (D, A's, O and upper portion of R). Table 2 shows the distribution of sizes, shapes and die chips.

	Large (n=19)	Small (n=28)		Curved (n=7)	Flat (n=40)		Open (n=40)	Closed (n=7)
Die Chip	6	7		4	10		13	1
No Die Chip	13	21		3	30		27	6

Table 2. Die letter elements and chipping characterized by size and shape and closure.

Statistical testing to determine whether the variables size, curvature or closure, and chipping are independent revealed that all these shape relationships, even allowing for small sample sizes, are statistically insignificant. However, it is clear from Table 1 that the bulk of the chip failures fall into four locations, N right, S1 Upper, S2 Upper and M left.

The Orientation of Openings in the Reverse Letters

Figure 5 illustrates a token die with lettering serifs like that found on capped bust dies. Of note are the incuse areas of the central portions of the letters and the vertical risers that, if this token were struck in a screw press, would experience stress from a striking force against the vertical face of the die element.

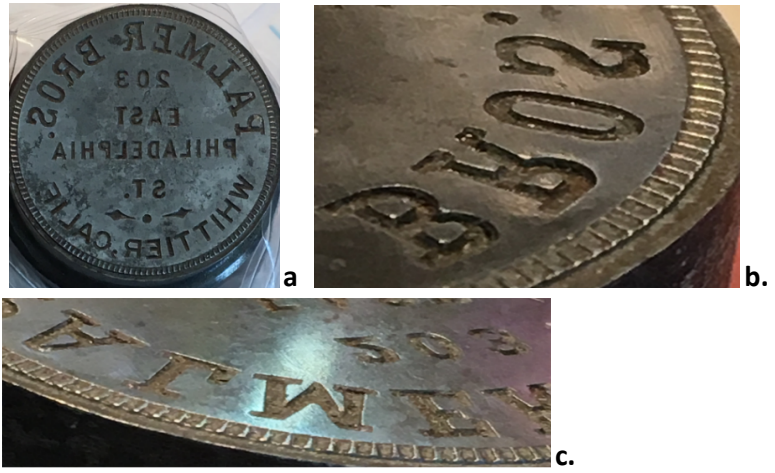

Figure 5. Token die with serifs like those used on capped bust dies. **a.** Top down view of incused and reversed lettering. **b.** Angled view showing the raised central

elements in S, O, R and B. **c.** Angled view of raised and depressed elements on the letters E, M, L and A. Slight chipping appears at the top of the two inner angles of the M.

Figure 6 shows magnified images of the letters M and S and a schematic of the likely flow lines and stress concentration at these locations that might be expected if the strike was from the rotational movement and stress produced by a screw press.

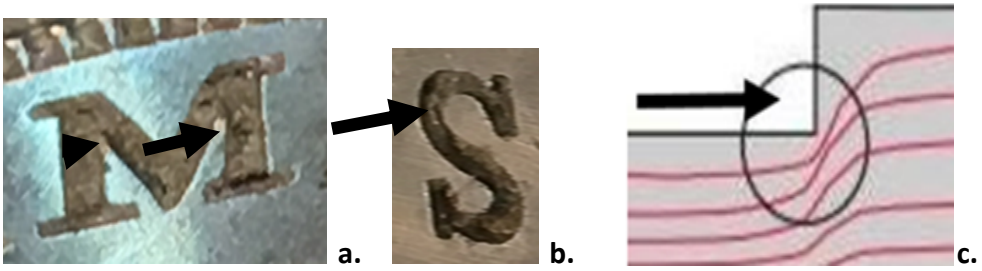

Figure 6. Stress concentration locations at vertical elements on **a.** the letter M, and **b.** the upper loop of an S. **c.** Arrows represent the application of force and the circle shows the area of stress concentration against the riser.

When the 14 identified chip locations from Table 1 are diagramed (Figure 7) a common vector which appears to be related to 12 of the 14 die chip locations can be drawn that abuts against vertical risers. The exceptions are the lower loops of S1 and S2, (circled in Figure 7) which represent 4 chip occurrences (~7%) that face in the opposite direction and are anomalous relative to the other die chips. Therefore, it appears, with few exceptions, that chip locations are a function of the geometry and shape of the incuse area of stress raisers in the reverse die relative to the driving forces from the press. The two anomalous die chip occurrences are discussed below.

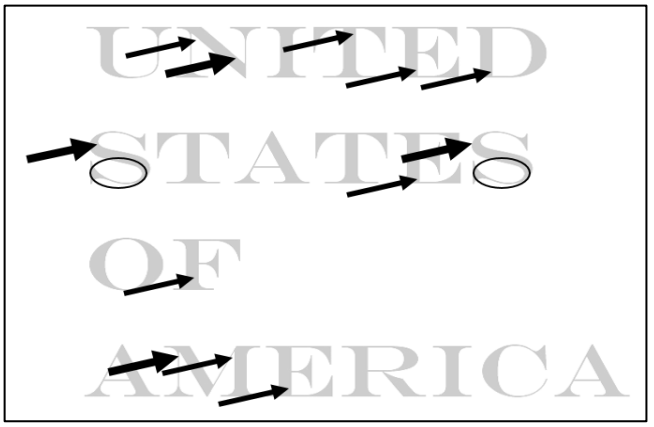

Figure 7. Locations of the 14 die chips on capped bust half dime reverse letters. Thick arrows point to locations with the greatest number of die chips while thin arrows point to locations with a lower incidence of chips. Lower loops of S1 and S2 (circled) are anomalous. Letters are shown as they appear on the minted coin and not incuse as they appear on the die.

1832 LM3 Very Late Die State- Die chip in the lower loop of S1.

1832 LM3 presents an interesting case of a die chip that is both undocumented in Federal Half Dimes (Logan and McCloskey, 1998) and which occurs in an anomalous location, namely the lower loop of S1. Figure 8 shows a very late die state of Reverse Q, while Figure 9 shows the progression of the die chip from its earliest appearance as a tiny offset in the rightmost portion of the lower loop of S1 to a very well-developed chip with a considerable raised area filling about half of the lower loop of S1. Additional die cracks are plainly visible in both Figures 8 and 9d that suggest that Reverse Q may have failed with a CUD shortly after striking this coin. The anomalous position of this chip on this heavily used reverse suggests, in contrast to rotational stress induced failure, that failure on this die may have been produced by clashing.

Figure 8. A Very Late Die State example of 1832 LM3 (Reverse Q) which shows an unusual die chip at the lower curve of S1 as well as a die chip on the right side of the N. A close-up of the die chip from this coin also shown in Figure 9d. Die cracks appearing along the scroll suggest that the die may have ultimately failed with a CUD.

Figure 9. Progression of the die chip in the lower loop of S1 on 1832 LM3. **a.** illustrates an early state with no die chip but a suggestion of the beginning of an irregularity in the inside of the lower loop of S1, **b.** shows the onset of the chip and, **c.** a slightly later version of the early chip die state, while **d.** shows the full progression of the chip found on a VLDS of Reverse Q.

1837 LM1 & LM4- Anomalies or Something Else?

Before discussing the anomaly represented by Reverse EE (LM4) it is important to note in reviewing Table 1 that both early (1829 A, B, &C) and late (1835-1837 CC through MM) reverse dies do not, except for Reverses EE (1837 LM4) and KK (1837 LM1), exhibit die chips. Since the use of these reverses coincide with the beginning and end of capped bust half dime coinage it is interesting to speculate that perhaps die chips are associated with changes in the application of striking force in the minting process.

While I have been unable to uncover any change in the minting process in 1829 that may have altered the way coins were produced, it is interesting that of the remaining reverse dies used in 1829 (E, F, G, H, J and M), all but Reverse E were also used on coins dated 1830 or 1831. The timing may suggest some undocumented change in the minting process or die quality, producing different stress fields on the working dies late in 1829 or early in 1830. Later in the series from 1835 through 1837, 6 out of 10 obverses (1835 Obv. 2 (CC), 1836 Obv. 1 (DD & FF) & 2 (GG), 1837 Obv. 1 (KK) & 3 (EE)) are known to have failed with bisecting obverse cracks. As with other capped bust denominations (dimes and quarters), it has been suggested that these failures occurred in conjunction with the installation and testing of the new steam press in late 1835 and its adoption for coinage in 1836 (Tompkins, 2008). The application of force without rotational movement likely produced a completely different stress field with failure modes that may have precluded chipping.

1837 LM1 (Rev. KK) and LM4 (Rev. EE) present an interesting dilemma having failed with both obverse bisecting cracks and reverse die chips. While 1837 LM1 cannot be definitively set in the emission order since its obverse and reverse dies (Obv. 1, Rev. KK) were only used for this marriage, 1837 LM4 (Obv. 3, Rev. EE) is interesting in that its reverse (EE) was also used for the earlier production of 1835 LM10 (Figure 10). The 1835 LM10 Obverse (Obv. 6) is not coupled with any other reverse die and as such is essentially floating in the emission order. While I know that some readers familiar with the emission order given in Logan and McCloskey (1998 pp. 57-64) may disagree with this statement, Table 2 (left), which shows the "given" emission order for Collars #7&8, clearly shows an apparent anomaly in the position of 1835 LM10 with respect to collar diameter.

Figure 10. 1835 LM10. a. EDS (AU58), b. LDS (MS63). Note significant flow lines in front of mouth on the LDS example, c. Unfilled S2 on rarer EDS, d. Filled S2 on the relatively common LDS

Table 2. Left. Emission order and collar size for Collars #7&8 (97 reeds) as given in Logan and McCloskey (1998). The authors noted a range from 0.6083 to 0.6115 for coins from collar #8. 1835 LM10 (**bold**) is clearly out of sequence. **Right.** Alternative emission order moving 1835 LM10 to the beginning of the collar #8 sequence and adding the oversized 1835 LM10 EDS to the end of the collar #7 sequence.

Table 2.

Year	Marriage	Collar	Diameter (in)		Year	Marriage	Collar	Diameter (in)
1835	LM5.1	7	0.6157		1835	LM5.1	7	0.6157
1835	LM6	7	0.6160		1835	LM6	7	0.6160
1835	LM5.2	7	0.6160		1835	LM5.2	7	0.6160
1835	LM7	8	0.6087		1835	LM10EDS	7	0.6160
1835	LM8.1	8	0.6097		1835	LM10	8	0.6083
1835	LM9.1	8	0.6108		1835	LM7	8	0.6087
1835	LM8.2	8	0.6100		1835	LM8.1	8	0.6097
1835	LM10	8	0.6083		1835	LM9.1	8	0.6108
1836	LM1.1	8	0.6110		1835	LM8.2	8	0.6100
1835	LM9.2	8	0.6107		1836	LM1.1	8	0.6110
1836	LM1.2	8	0.6103		1835	LM9.2	8	0.6107
1836	LM2	8	0.6100		1836	LM1.2	8	0.6103
1835	LM11	8	0.6106		1836	LM2	8	0.6100
1836	LM3	8	0.6106		1835	LM11	8	0.6106
1836	LM4	8	0.6115		1836	LM3	8	0.6106
					1836	LM4	8	0.6115

As Logan and McCloskey (1998, p. 58) note, edge collars increase in size over the life of the collar due to hoop stress which is the force exerted circumferentially (perpendicular to both the axis and radius of the object) in both directions on the cylinder wall and to friction and resulting heat expansion as the coin was forced out of the collar. So, given this expansion with use, it is expected that a given die progression will roughly have, to the degree of measurement uncertainty/error, a constant increase in size during production. As can be seen in Table 2 (left), Collar #8 diameters generally increase with emission order. However, 1835 LM10 is significantly out of order in terms of collar size. I have confirmed this diameter over a range of grades for the common 1835 LM10 that display die chips in the upper loops of S1 and S2 (MDS & LDS). I also measured a rare EDS 1835 LM10 that does not display die chips in S1 and S2. This EDS has a diameter of 0.6160 inches. While well outside the range of diameters documented for collar #8 it fits perfectly for the later sequence from collar #7. This suggest that 1835 LM10 was struck with two different edge collars (see Logan and McCloskey, 1998, pp. 58-60 for a discussion of edge collars and instances where a single variety was produced with more than one edge collar). This most likely places 1835 LM10 both at the end of the collar #7 sequence and near the beginning of the collar #8 sequence. Perhaps the early use of this die pair was with the screw press where the reverse

developed die chips and the second use in 1837 was with the steam press, where the obverse die developed a bisecting crack, was one of economy and perhaps even desperation as the series was winding down.

Since die chips are uncommon for any of the later reverse dies, and since both 1837 LM1 and LM4 are to varying degrees "floating" in the emission order, this suggests that some additional analysis is necessary to understand the appearance of die failures in the 1835 and later marriages. One possibility is that the Logan and McCloskey (1998) emission order may need to be modified slightly or possibly may be in error. However, that discussion is beyond the scope of this paper and I leave it for a future article.

Conclusions

Die chips on capped bust half dimes are found on a higher percentage of reverse dies than on any other capped bust silver denomination. This is likely due to the small size of the obverse and reverse dies relative to the striking force. These chips form in predictable locations related to die geometry and its interaction with the rotational striking force produced by the screw press. Their appearance between late 1829 and early 1835 is likely a function press type. In the case of later year reverses the disappearance of chips is likely associated with the change to the steam press and resulting vertical force applied to the die. Anomalies later in the series suggest that a more thorough examination of edge reed counts, and coin diameters, may be required to better understand and document emission order and die remarriages.

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The Silver Plug Dollars of 1795

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Despite over 200 years of silver dollar collecting, the fact that some Flowing Hair dollars had a silver plug inserted into their centers had escaped notice until the early 1980's. Even specialists that had seen virtually every die marriage, such as J.W. Haseltine and M.H. Bolender, completely missed this anomaly in their comprehensive reviews of the series[12]. Early theories included the possibility that the silver plug could have been a fineness adjustment, however X-ray spectroscopy on multiple samples was unable to detect any differences of the fineness of the silver alloy in the plug versus the surrounding planchet, to within measurement error. Ken Bressett, at the October 1993 meeting of the American Numismatic Society, concluded a plug of the same composition as the planchets had been added to bring underweight blanks up to specifications. This explanation has been accepted by numismatic scholars since. Certainly, the technology existed at the mint as they had prepared copper pattern cents in 1792. The silver centered cent of Judd-1 was struck with a silver center to bring the intrinsic value of the coin up to a cent[3]. A hole was made in the center of the blank with some type of a punch then a small piece of a silver dowel slightly thicker than the blank was placed into the void and the press was cycled fusing the two pieces of metal together resulting in a circular silver plug in the center of the coin. Consequently, when the new mint was faced with the problem of underweight planchets, it is unsurprising that this solution was employed resulting in an ~8mm circular plug in the silver plugged dollars (See Figure 1).

Figure 1: (left) Silver Centered Pattern Cent of Judd-13 (courtesy of Stacks), (right) Silver Plug dollar, B-1 (courtesy of Heritage Auctions)

In the past 25 years approximately 100 – 130 silver plugged coins have been discovered, most of them 1795 dollars. A single 1794 dollar has been discovered as well as a unique double plugged 1795 dollar and 2 marriages of half dollars.

Q. David Bowers did a comprehensive review of the silver plugged dollars by die marriage in 1993, using the plugged die marriages to determine the rough emission order of the dollars dated 1795[4]. Bowers with Mark Borckardt poured through hundreds of auction catalogs from 1950 to 1993 to catalog the die marriages represented. Though they attempted to eliminate duplication and misattributions, most coins were not certified, and some were not photographed making some duplication unavoidable.

In this work, I have reviewed the databases of Heritage Auctions, Stacks/Bowers, as well as the Goldberg and David Lawrence catalogs dating back to 1996 in an attempt to make a more comprehensive review. Most coins in these databases were certified so it was possible to eliminate many duplications. Coins that were raw were entered only once for the grade to avoid duplication of individual specimens. I reviewed photographs when available to eliminate crack-outs and resubmissions. The results are that I have captured 92 unique silver plugged dollars of 1795 by date, grade, marriage, and certification, representing 75-90% of the entire estimated population. The summary by marriage follows:

Bolender #	# of variety	% of total	Head Style	Leaves
3	9	9.8%	94	2
4	8	8.7%	94	2
9	4	4.3%	94	2
7	35	38.0%	95	2
1	31	33.7%	95	3
5	4	4.3%	95	3
19	1	1.1%	95	3

The average grade is 31.5, PCGS has certified 55, NGC 20 with the others certified by NCS, ICG or raw. 63 are straight graded and 29 details graded.

As the silver plug was used in early 1795, perhaps as early as May and ceased in October, 1795 when the first Draped Bust Small Eagle dies were used, it is possible

to gain some insight into the emission order of the different die marriages. As Bowers discusses, B-3, B-11, B-9, and B-4 can be assigned to the first striking period due to the obverse style being more primitive[3]. These obverse dies labeled 1 and 2 by Reiver[5] have similarities to the head of 1794, notably the neckline is more rounded. The reverse pairings, dies labeled A, B, and C[4] have an early style reverse with 2 leaves and a simpler wreath (See Figure 2).

Figure 2: B-3 courtesy of PCGS CoinFacts

Further, examples of B-4 struck over a 1794 dollar are known, so B-4 would be one of the earlier marriages. Reiver labeled all the obverse dies with numbers and the reverse dies with letters facilitating the elucidation of the die chain which makes the emission sequence of the various die pairings clear. As dies were generally used until one of them failed, it is possible to trace the die chain and establish the emission sequence of marriages. Reiver connects the die chain with obverse 1 being used to strike B-3 (likely the first 1795 dollar) then being paired with reverse B for B-11, and reverse C for B-9. B-9 has been seen with clash marks which B-3 and B-11 do not have so it is the final use of reverse C. Obverse 2 is then paired with reverse C to make B-4. All these die marriages are represented in the silver plug population except for B-11 which is an R-6. The overall rarities of the die marriages must be considered as high rarity pairings that failed quickly will result in lower populations of silver plugs. An R-6 having 13-30 known examples may well have no surviving silver plugged examples.

Figure 3: B-7 (courtesy of PCGS CoinFacts)

The analysis gets trickier when we start to consider dies from striking period 2 and later. Reiver's analysis of Bolender's die marriages shows the following die chain. Obverse 3 was paired with reverse D to make B-8. When obverse 3 failed, reverse D was paired with obverse 4 (B-20). When D failed, reverse E was paired with obverse 4 (B-18). After E, reverse F was paired with obverse 4 (B-7). As 38% of the silver plug population is B-7, how is one to explain the complete lack of B-8, B20, and B-18 amongst the silver plug population? The answer is possibly again in the overall rarity of these die marriages, all being R-8 (2-3 known). B-7 is an R-4 with 76-200 examples estimated known containing the highest population of silver plugs in the study. Continuing the die chain, when obverse 4 failed, F was paired with obverse 5 to make B-19, which despite being an R-8, has a single example of a silver plug known.

Obverse 5 was then paired with reverse G to make B-2 which is an R1. When obverse 5 was replaced with obverse 6, we have B-1. How can we understand that 33.7% of the silver plug population is B-1 while a plugged B-2 is unknown? One explanation is that B-1 was minted prior to B-2. It is possible that following B-19, the dies were removed for a changeover. The mint also had the responsibility of making $10 gold pieces on the same machinery. When reverse F failed, obverse 5 was removed for the changeover. Following, obverse 6 and reverse G were used to make B-1. The problem with this theory is that it requires another event to replace

obverse 6 with 5 to make B-2 and then a third to bring obverse 6 back into service to make B-10 and B-16. A simpler and more likely explanation is that B-2 was minted with a planchet run that was within tolerance needing limited plugs.

The lone marriage out of sequence is the late stage B-5, the most common of all 1795 Bolender numbers. The existence of silver plugs in the B-5 die marriage is a relatively recent discovery, having not been mentioned as existing in either the 1993 work of Bowers nor in the 1999 work of Reiver, which contains an overview of the silver plug variety authored by John J. Haugh.

There are four examples of silver plugs within the B-5 die marriage, all auctioned by Heritage at various times in the 21st century, including

1. An NGC Fine-12, Heritage 4/23/2015
2. An NGC AU-53, notably the only silver dollar found with two mint made plugs, Heritage 8/10/2016
3. A PCGS VF-20 Heritage 1/7/2000
4. A PCGS VF-25, Heritage, 7/21/2004 and 3/29/2009

Photographs of each coin are available in the Heritage database. They are all clearly different coins, all correctly attributed as B-5, and the silver plugs on at least the AU-53 are clearly evident even from the available photographs (See Figures 4a and 4b).

Figure 4a: NGC AU-53, B-5, unique double silver plugged dollar (Courtesy of Heritage Auctions)

Figure 4b: Expansion of both plugs of the AU-53, B-5 specimen (Courtesy of Heritage Auctions)

It may be helpful for the study of the silver plug specimens of this marriage if the owners of these coins could come forward and perhaps provide more high resolution photographs for examination.

There are three obverse and three reverse dies that had to be used to get from B-1 to B-5, none of which resulted in die marriages that have a known silver plug. The die sequence following B-1 includes B10, B-16, B-21 all of which are all R-7 to R-8. Then follows B-6, an R-3 with 201-500 survivors then B-5, R-1 with > 1,250 survivors. The sheer number of examples of an R-1 marriage has resulted in a number of examples of plugged examples which by the end of 1795 would have been infrequent at best. Still, it is possible some examples of B-6 may be discovered with a plug.

The plugging process appeared to have been one that began early in the series, picked up in the middle of production and fell off late in the year once the planchet preparation process had improved. Finally, if I may conclude with a bold prediction, the planchet preparation process appeared to have improved rather quickly, but it is difficult to believe a problem that was identified (underweight planchets) and a solution (silver plugs) would be abandoned after only 6 months. There were possibly some Draped Bust dollars (B-14 and B-15, Figure 5) that were silver plugged, and it is possible a survivor may come to light in the future.

Figure 5: B-14 (left) Off-Centered Draped Bust Dollar, B15 (right) Centered Draped Bust Dollar (Courtesy of Heritage Auctions)

1. *John W. Haseltine, Catalogue of John. W. Haseltine Type Table – US Dollars, Half Dollars, and Quarter Dollars, Davis and Pennypacker, Philadelphia, PA (1881).*
2. *M.H. Bolender, The United States Early Silver Dollars from 1794 – 1803, Krause Publications, Iola, WI (1950).*
3. *J. Hewitt Judd, M.D.,United States Pattern Coins, 10th ed., Whitman Publishing, Atlanta, GA (2009).*
4. *Q. David Bowers, Silver Dollars and Trade Dollars of the United States, A Complete Encyclopedia, Volume 1, Bowers and Merena Galleries, Wolfeboro, NH (1993).*
5. *Jules Reiver, The United States Early Silver Dollars 1794-1803, Krause Publications, Iola, WI (1999).*

The Birth of Gold Coinage at the New Orleans Mint: The 1839-O Classic Quarter Eagle

By Daryl Haynor

Note : This article is excerpted from my upcoming book Classic Head Gold based on ten years of research and offering a comprehensive analysis of the quarter eagle and half eagle series. The work contains valuable materials gathered by John McCloskey who has entrusted his 20+ years of research material to the author for inclusion in the book.

The 1839-O quarter eagle is intriguing for several reasons. It is the first gold coin struck at the newly opened New Orleans Branch Mint. It is the only New Orleans quarter eagle with its mint mark on the obverse since no Classic gold half eagles were minted, and the quarter eagle design changed to the Liberty Head in 1840. Also, it is the only Classic gold produced at the southern branch mint at New Orleans, making it a one-year type coin. Not surprisingly, it is popular among collectors.

This article offers a glimpse into the operations of the New Orleans mint in 1839, analyzes official mintage records of the 1839-O quarter eagle, presents an analysis of the known die marriages including die descriptions, die states, and rarity that concludes with an observation about quarter eagles in medal alignment.

Mint Beginnings

The New Orleans mint was born under a cloud in 1838 as it commenced operations. The qualifications of the politically appointed officers, including the Superintendent and Treasurer, were questionable. Superintendent David Bradford and Treasurer Edmund Forstall were local residents appointed by President Martin van Buren and known supporters of the party in power. However U.S Mint Director Dr. Robert Patterson appointed other officers with sterling qualifications. The first Coiner at the New Orleans mint, Rufus Tyler, was trained in the Mint at Philadelphia, as was James Maxwell, the first Melter and Refiner.

New Orleans Branch Mint viewed from Esplanade Street in 1890.
(Library of Congress)

Early mintage was limited to dimes and half dimes, and superiors in Washington, D.C deemed the dollar value of the production unacceptable. Depositor's impatience and claims for coinage grew. Their gold deposits mounted within the Mint. Charges and countercharges from officers and employees at the Branch Mint were lodged in Philadelphia, including allegations of fraud. By mid-1839 the situation boiled over when a silver deposit record came up missing, and several silver deposits had assay discrepancies.

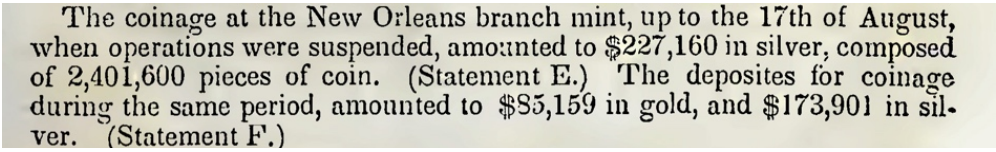
In late May of 1839, U.S Mint Director Robert Patterson requested that Thomas Slidell, District Attorney for New Orleans, investigate the operations of the Branch Mint. Shortly after Slidell completed his investigation, an epidemic of yellow fever broke out in New Orleans. The Mint was forced to close its doors on August 17, 1839, and it did not reopen until November 30.

Melter and Refiner Maxwell succumbed to the dreaded disease on August 18, 1839 followed by Coiner Tyler, on September 8th. Both were under bond, and given the difficulties at the branch mint, the families of the deceased insisted that the vaults of these officers be sealed until a proper accounting could be made.[1]

Slidell's report was received in early September by the eastern authorities, including Director Patterson. It did not bode well for the branch mint officers, particularly the Superintendent and the Treasurer. The Treasurer was fired immediately and the Superintendent was removed by the end of the year.

On October 13, 1839, the vault of Rufus Tyler was opened under the authority of the courts and the coins found included 385 quarter eagles with a value of $962.50[2]

Reporting and recordkeeping were not strong suits at the New Orleans branch mint. The existence of quarter eagles in Tyler's vault did not comport with the branch mint report at year end to Director Patterson when the mint closed in August 1839. In his Annual Report to President Jackson due by the end of January 1840, Patterson relayed that only silver coins were struck:



The coinage at the New Orleans branch mint, up to the 17th of August, when operations were suspended, amounted to $227,160 in silver, composed of 2,401,600 pieces of coin. (Statement E.) The deposites for coinage during the same period, amounted to $85,159 in gold, and $173,901 in silver. (Statement F.)

Patterson received an update from New Orleans and had to correct his report to the President by writing to him on February 6, 1840:

> *In the annual report, which I had the honour to send to you on the 30th ultimo, I was under the necessity of leaving the statement imperfect in respect to the operations of the New Orleans Mint, from which I had not been able to obtain the necessary information. A communication just received from the superintendant of that mint states, that, from the re-commencement of operations, in November, to the end of the year, they coined $23,490 in gold, consisting of 9,369 quarter eagles.*[3]

Thus, the official mintage records reflected only 9,936 coins struck in 1839, and did not account for 385 quarter eagles in the Coiner's vault in October. 1839-O quarter eagles must have been minted before December 1839, but how many?

A review of the internal coinage delivery records at the branch mint indicates that the first delivery of 8,000 quarter eagles from New Orleans occurred on August

9th, 1839, with 8 reserved for assay. The striking of the first gold coins in New Orleans at this time is plausible. The gold bullion ledger for the mint as of early 1839 shows that gold had been held on deposit for months. Knowing that the mint was planning to shut down for the summer under the threat of yellow fever, it seems likely that Tyler and Maxwell sought to coin all of the available gold on hand. Thus, 8,000 coins were delivered to the mint treasurer, and an odd-lot of 385 pieces remained with the Coiner.

The official mintage remained at 9,936 until 1886 when it was revised to 17,781. How that figure was derived is still subject to debate. Adding the 8,000 coins delivered on August 9th to the 385 coins found in the vault of Tyler on October 13, 1839, and the 9,936 coins reported as delivered in December 1839 results in an accounted for mintage of 18,321.

The official mintage for 1839-O quarter eagles has remained at 17,781 since 1886. However, there is another production of coins dated 1839-O yet to be accounted for that significantly changes the official mintages. That is a topic beyond the scope of this article.[4]

1839-O Die Marriages

On the two distinct occasions when quarter eagles were struck at New Orleans, two obverse dies and two reverse dies were used, resulting in two die marriages.

The date has the same general style as the 1839 Philadelphia quarter eagle. However, the two obverses can be distinguished from one another by the position of the date in the field. One obverse has a high date with all four digits far from the dentils, while the other exhibits a low date with the digits closer to the dentils.

The two reverse dies for this issue have the revised shield with two pale gules. This distinguishes them from the 1839 Philadelphia reverse that used an old die with three pale gules.

The two 1839-O reverses are distinguishable by the fraction in the denomination. One has a wide fraction with the two digits distant from the fraction bar. The other has a close fraction with the 2 joined to the fraction bar and the 1 close to it.

The High and Wide Die Marriage

Obverse - High Date

Date: The date is high, far from the dentils. Shallow upper serif on 1. Script 8. Medium center line on 3. The upper bulb shows retouching, and the digit is lower. New Orleans mintmark is over left side of the 3 and closer to the bust.

Stars: Small stars. Stars 11 and 12 are repunched.

Border: 144 dentils.

Reverse - Wide Fraction

Eagle: No tongue. Two pale gules.

Denomination: Wide fraction. The numerator and denominator are distant from the vinculum.

Devices: Weak branch stem. No berry. The third arrowhead extends to below the middle of the A. The middle arrow tip extends under and nearly to the center of C.

Lettering: D in UNITED is low. Second T in STATES is low.

Border: 140 dentils.

This die marriage is referred to as High and Wide, as the date on the obverse is high (further from the dentils) and the fraction on the reverse is wide. About two out of every three 1839-O quarter eagles are this die marriage. With an estimated survival rate of 300 coins, it is an R-3 rarity.

This is the only use of the High Obverse. It shows little die wear, with no die cracks. Most (perhaps all) coins show faint die clash marks, as the azures of the reverse shield can be seen in Miss Liberty's ear. The obverse is generally well struck and weakness first appears in the curls underneath the hair ribbon. Die polishing eventually makes some of the hair curls appear fragmented, particularly surrounding the Y in LIBERTY, which should not be mistaken for wear.

The Wide Reverse was also only used this one time. The reverse strike is usually strong, with occasional weakness in the upper left portion of the shield.

Every known example has a die crack from the rim through the lower left corner of I in UNITED, to the tip of Leaf 1, through the talons to the center of the large 2 in the denomination, and extending to the rim. A die crack also emanates from the lower right portion of the I and extends to T and faintly to E.

Other die cracks developed. One connects the base of the letters within STATES, while another faintly shows between the upper portions of the letters. The base of OF is also connected by a crack, while many coins have another that connects the upper right serif of the F to the dentils.

All pieces show a weakness through the stems and leaves and all three arrow shafts nearest the eagle's talons. Yet other coins will show additional weakness along the lower portion of the reverse, likely a result of die lapping. This weakness includes the last letters of AMERICA, the arrow tips, the branch and stem, the denomination, and the right upright of N in UNITED. At its worst, the branch stems, and leaves 3 and 4 near the stems are nearly obliterated.

The collar has 106 edge reeds. The average diameter is .7136 inches.

The Low and Close Die Marriage

Obverse - Low Date

Date: The date is low and close to the dentils. Tall upper serif on 1. Script 8. Long center line on 3. Digit 9 is closer to the dentils, and all digits are level. New Orleans mintmark is over the space between 3 and 8 and centered between bust and date.

Stars: Small stars. Stars 1, 3, 4, 5 and 13 are slightly repunched.

Border: 145 dentils.

Reverse - Close Fraction

Eagle: Two pale gules. Very weak tongue not visible on most coins.

Denomination: Close fraction. The 2 touches the vinculum and the 1 nearly does.

Devices: Bold branch stem. Weak and detached berry. The lowest arrow tip touches the left portion of the right base of the A. The middle arrow tip touches C.

Lettering: U in UNITED is high and ED is close.

Border: 143 dentils.

The Low and Close die marriage has the date low near the dentils. The reverse has the numerals in the fraction close to or touching the vinculum. About one out of every three 1839-O quarter eagles is this die marriage, making it the rarer of the two with an R-4 rating.

This is the only use of the Low Obverse. It exhibits very good strike detail, and any weakness first appears in the radials of Stars 6 through 9. In the late die state, a large die crack develops from the rim between Stars 4 and 5 that eventually travels across the field and directly into the eye of Liberty. The crack continues into the large hair curl above the ear. This late obverse die state is extremely rare.

This is also the only use of the Close Reverse. The strike is excellent but the berry is always detached. All examples have numerous die cracks. The left wing tip abuts a die crack that traverses to the rim. The left wing has a die crack on the inner side that connects to the eagle's beak, traverses through eagle's head and the field to the right wing, then on to right wing tip and rim, then to the second A in AMERICA. Another begins at the rim above the R, travels to the upper arrow tip, through the arrow shaft and talons and into the left field. A final crack begins at the rim and travels through the left upright of N in UNITED, extends to the Leaf 1 tip and connects to the aforementioned crack.

The collar has 105 edge reeds. The average diameter is .7158 inches.

High **Wide**

Low **Close**

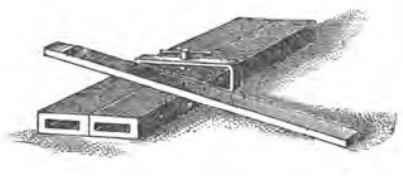
Close-Up of the High and Wide Date and the Low and Close Fraction

1839-O Quarter Eagle in Medal Alignment

Auction catalogues, numismatic publications, various articles, and dealer websites have noted that some 1839-O quarter eagles have a reverse rotated 180 degrees, or in medal alignment. That is, the top of the obverse and reverse are aligned with each other as opposed to being inverse to each other in coin alignment, as normally found on U.S coins. Third party grading services will denote on their holder if a coin is in medal alignment. These specimens are often advertised as extremely rare.

A thorough analysis of survivors indicates that only the Low and Close die marriage occurs in medal alignment, and in fact ALL 1839-O Low and Close quarter eagles were struck that way! The author has documented a large percentage of the known survivors and has yet to find a Low and Close die marriage in coin alignment. Even without the differing die alignment, the two die marriages are distinct and some collectors opt to obtain examples of each marriage.

How did this happen? How could an entire production of quarter eagles have escaped notice of branch mint personnel? Studying the tragicomedy that was the New Orleans mint may provide the answer. It is plausible that all coins from one of the production runs were improperly aligned. The first quarter eagles were minted at New Orleans in August 1839. Shortly after the branch mint was closed due to the outbreak of yellow fever. Coiner Rufus Tyler was trained in Philadelphia and throughout 1838 and 1839 had no problem properly minting half-dimes, dimes, and halves at New Orleans until his passing in September 1839.[5] Philos B. Tyler, brother of Rufus Tyler, became Coiner. His self-proclaimed qualification for the job consisted of his assertion that he was a worker in the coin room at the New Orleans mint using machinery under his brother's direction.[6] He apparently had no other experience.



Melter and Refiner molds for casting alloy ingots and a sample ingot. Circa 1861 Philadelphia Mint

Though officially re-opened in November 1839, the New Orleans Branch Mint did not fully commence operations until after December 9, 1839[7] when newly appointed Melter and Refiner, John Riddell, reported for duty. It took some time to notify Riddell of his appointment, as he was "on a botanical and geological tour in the wilds of Texas."[8] The quarter eagles produced in August 1839 appear to have nearly exhausted the supply of quarter eagle ingots on hand. Consequently Tyler could not coin more quarter eagles until the Melter & Refiner produced more gold alloy ingots.

It had been several months since gold coins were struck, and the Branch Mint remained under pressure from the mint in Philadelphia and depositors to quickly produce coins. The second mintage in 1839 of 9,369 quarter eagles occurred in late December, and could easily have been struck in one day. Tyler was responsible for setting the dies, and it was the first time he attempted it with quarter eagles. Under these circumstances, it is not surprising that an entire production of quarter eagles were incorrectly made in medal alignment.

John L. Riddell

The southern branch mints in Charlotte and Dahlonega produced only gold coinage throughout their life. Both began one year earlier in 1838. They also had start-up problems, but nothing as tumultuous as the panoply of hurdles dealt with in New Orleans. Despite it all, the New Orleans 1839-O quarter eagles were of higher quality than those produced by the other branch mints in the early years, and are among the most lustrous and attractive Classic gold coins in the entire series. The two distinct die marriages are worthy of collector interest and the circumstances of their coinage only add to their intrigue.

1. *R.W. Julian, "Dimes First to Flow in New Orleans," The Numismatic Scrapbook, September 1968. Julian also wrote that other silver coins may have been minted under mysterious conditions prior to the mint's official reopening.*
2. *R.W. Julian, "Dimes First to Flow in New Orleans," The Numismatic Scrapbook, September 1968. In another article, Walter Thompson, "The Trouble at the New Orleans Mint- 1839," The Numismatic Scrapbook, March 1960, pg. 634, the new Treasurer of the branch mint, H.C. Cammack unsealed the vaults and counted 379 quarter eagles.*
3. *In reaction to NARA-CP RG 104 Entry 216 Volume 5. Letter from Patterson to Secretary of Treasury Levi Woodbury dated February 3, 1840, reporting that correspondence was received from the Treasurer of the New Orleans Branch Mint that $23,490 of coinage in quarter eagles was struck since resumption of work.*
4. *Coinage of quarter eagles in March 1840 were included in 1840 mintage figures but were actually dated 1839.*
5. *At least the coins were in proper coin alignment. This unpropitious beginning had many causes including lazy and unqualified workers, political infighting, toggle presses constantly breaking down, and insufficient supply of dies from Philadelphia.*
6. *NARA-CP. RG56 Entry 289. Philos Tyler letter to Mint Director Patterson, October 1839.*
7. *NARA-CP. RG 104 Entry 214 Volume 1. Patterson letter to Woodbury dated December 10, 1839.*
8. *NARA-CP. RG 104 Entry 216 Volume 5. Patterson letter to Woodbury dated February 24, 1840. Riddell became well known for his pioneering work on the flora of the American West, and also for inventing the binocular microscope.*